



2016 QUARTERLY ISSUE #1

High-resolution time-depth records improve understanding of leopard seal behavioral ecology

Krause et al. used high-resolution time-depth records to study the diving and foraging behaviors of adult female leopard seals. This is the first such recording of leopard seal behavior, leading researchers to a greater understanding of leopard seal ecology, activity budgets, and haul-out probabilities.



During January and February from 2008 to 2014, researchers recorded 40,308 dives averaging about 2 minutes each, 90% of which were shallow (≤ 30 m deep). Most dives occurred at night, although haul-outs were positively correlated with available daylight.

These data also indicated individual differences in foraging effort by time of day and across years, and reveal the importance of benthic searching as a foraging strategy for leopard seals. Finally, this study supports indirect pathways of this apex predator's top-down forcing on Antarctic coastal ecosystems and, as a result, international fisheries and indicator species.

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Southern Resident killer whales eat mostly salmon in the Salish Sea summer range



Species diet is important in understanding predator-prey interactions and ecological niches, but is difficult to observe in a marine environment. Using DNA sequencing of fecal material, Ford et al. estimated the diet composition of the endangered population of Southern Resident killer whales.



The researchers inferred diet composition by the percentage of genetic sequence represented in the samples. Unsurprisingly, more than 98.6% of the samples were salmonids and the majority of those were Chinook salmon (79.5%) and Coho salmon (15%). Composition varied temporally, with killer whales eating more Chinook salmon in early summer and consuming more Coho salmon (increasing to $>40\%$) in late summer.

This method confirms the findings of previous diet composition studies based on surface prey remains and highlights the importance of one group of endangered species (salmonids) to another.

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California sea lion pup food is limited by poor-quality forage for breeding females

The California sea lion population has increased in the last 40 years. However, recent trends in pup nutrition may have long-term consequences on the population numbers and fill animal rescue centers with starving sea lion pups.



McClatchie et al. found that during the last decade, sardine and anchovy decreased in biomass while market squid and rockfish abundance increased. During this period of decrease in forage species quality, sea lion pup weights also decreased.

The researchers used a long-term, fishery-independent data set to explore this impact of forage decline on California sea lion productivity. Furthermore, a model identified forage quality in the female sea lion foraging range as the best explanation for the variance in pup weight. Thus, food quality of foraging females has consequences for the next generation.

The researchers suggest that the trend in forage decline is driven by environmental factors, due to the large spatial scale at which this trend is observed. If low-quality forage continues, California sea lion population numbers may be impacted.

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Crustose coralline algae may facilitate reef-building

In the central and south Pacific Oceans, calcium carbonate accretion rates vary within and between islands, reef zones, levels of wave exposure, and island geomorphology.



Vargas-Angel et al. placed plates at 78 discrete sites to measure calcium carbonate accretion rates of early successional recruitment communities. Reef slopes found on the outer edge of the fringing reef and exposed to the open ocean have higher accretion rates than lagoon sites. Also, windward sites have higher accretion rates than leeward sites. Crustose coralline algae percent cover, alkalinity, and chlorophyll *a* were positively correlated to calcium carbonate accretion rate.

This study demonstrates that crustose coralline algae are vulnerable to changes in ocean pH, and acidified ocean conditions can have adverse implications for other reef calcifying taxa.

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This newsletter is intended to summarize the latest research on protected species from scientific publications that include one or more NOAA Fisheries authors. It will be distributed quarterly with alternate issues highlighting research from the East and West coasts.

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